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TYPTON AUSTRALIS SP. NOV., A NEW PONTONIINID SHRIMP FROM THE GREAT BARRIER REEF, AUSTRALIA

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Figures 1-4

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SUMMARY

A new species of pontoniinid shrimp from the Great Barrier Reef, Australia, is described and illustrated. The new species shows several morphological features intermediate between species of *Typton* and another spongicolous genus *Onycocaris* Nobili. The systematic affinities of the new species are discussed and the features which distinguish it from other species from the Pacific and western Indian Oceans and from the single American species, to which it is most closely similar, are noted.

INTRODUCTION

Until recently the genus *Typton* Costa, 1844, appeared not to be represented in the Indo-West-Pacific fauna. One species was known from the Mediterranean and eastern Atlantic coasts of Europe and Africa and several species were reported from tropical American waters. Several species are now known to live in association with sponges. The presence of *Typton* species in the Indo-West Pacific region was first recorded by Fujino and Miyake (1969) who reported *T. dentatus* from the Ryukyu Islands. A second species, *T. bawii*, from Zanzibar in the western Indian Ocean was later reported by Bruce (in press, b). The present report records the presence of a third species of *Typton* in the southern region of the area, on the Great Barrier reef. The genus *Typton* is therefore widely distributed in the Indo-West Pacific region, although apparently the species are naturally rare or difficult to collect.

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SYSTEMATICS

Typton australis sp. nov.

Figs 1-4

Material examined. 1 ovigerous female. Chinaman's Reef (between Opal and Rudder Reefs), Great Barrier Reef, Queensland, Australia, 10 ft, from dead coral. Coll. A. H. Banner, 15 January, 1968.

Description. A small pontoniid shrimp with a subcylindrical body.

The carapace is smooth and slightly swollen. The rostrum is short, slightly depressed, and not reaching to the level of the cornea. The lamina is compressed and toothless. The tip is acute and slightly up-turned and the ventral border is strongly convex. There are no rostral setae. The orbit is obsolescent. The inferior orbital angle is absent and this region of the carapace shields the lateral aspect of the eyestalk. Supraorbital, hepatic and antennal spines are also absent. The anterolateral angle of the carapace is produced and rounded, and exceeds the level of the tip of the rostrum. The posterior margin of the branchiostegite is broadly rounded.

The abdomen is smooth and enlarged. The segments proper are dorsoventrally flattened and the pleura are expanded laterally to enclose a large marsupial chamber. The third segment is not produced posteriorly in the dorsal midline. The fifth segment is 1.4 times the length of the sixth segment, which is strongly flattened, and about 1.7 times longer than deep. The posterior lateral angle of the sixth segment is strongly produced and acute. The posterior ventral angle is broadly expanded laterally, acute, with a convex lateral border.

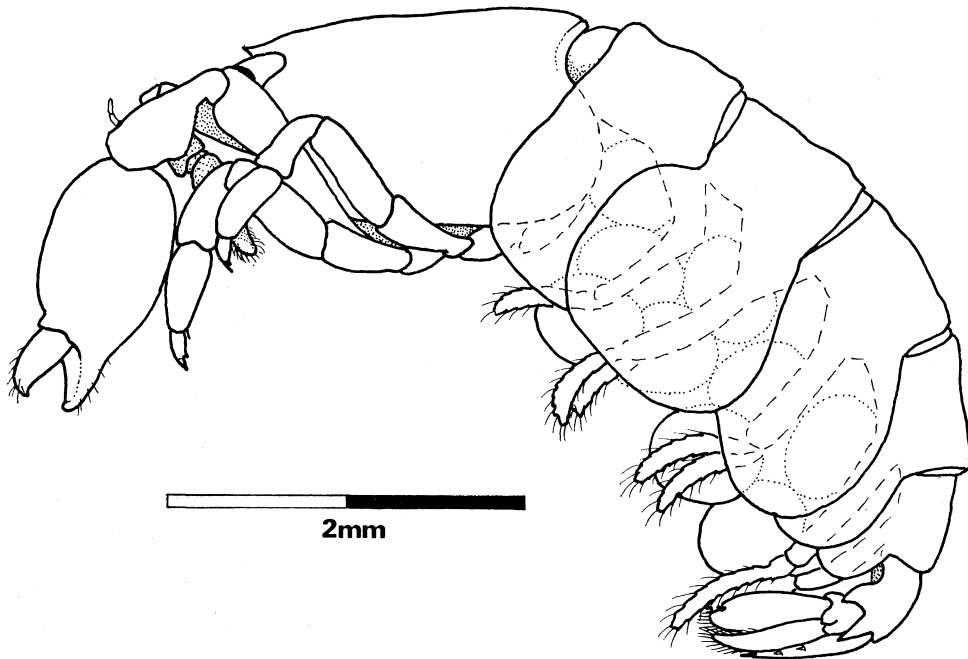


Figure 1. *Typton australis* sp. nov. Female, holotype

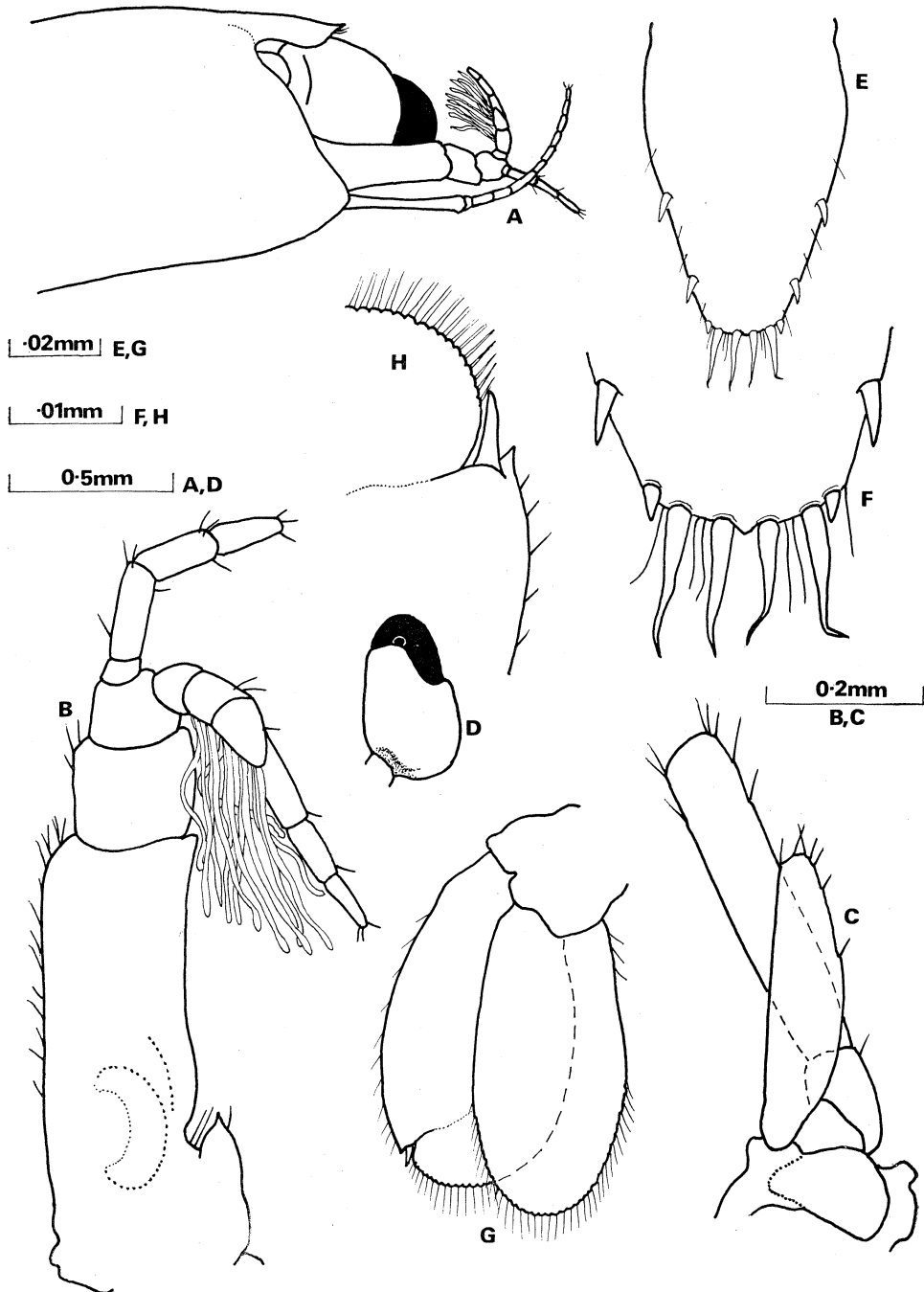


Figure 2. *Typton australis* sp. nov. Female, holotype. A, anterior carapace, right eye and antennae removed. B, antennule. C, antenna. D, eye, dorsal view. E, telson. F, termina telson spines. G, left uropod. H, disto-lateral spine of exopod of uropod

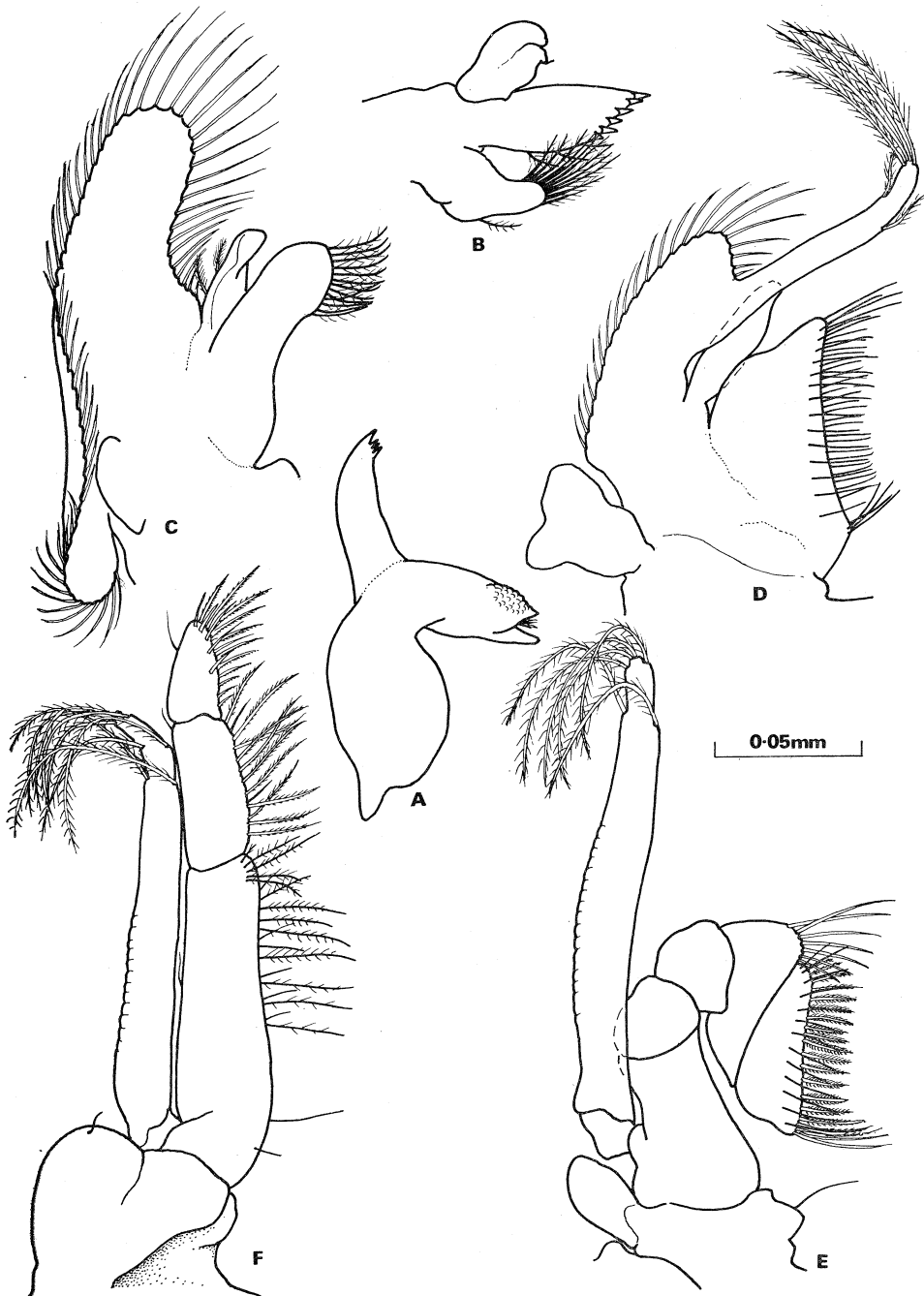


Figure 3. *Typton australis* sp. nov. Female, holotype. A, mandible. B, maxillula. C, maxilla. D, first maxilliped. E, second maxilliped. F, third maxilliped

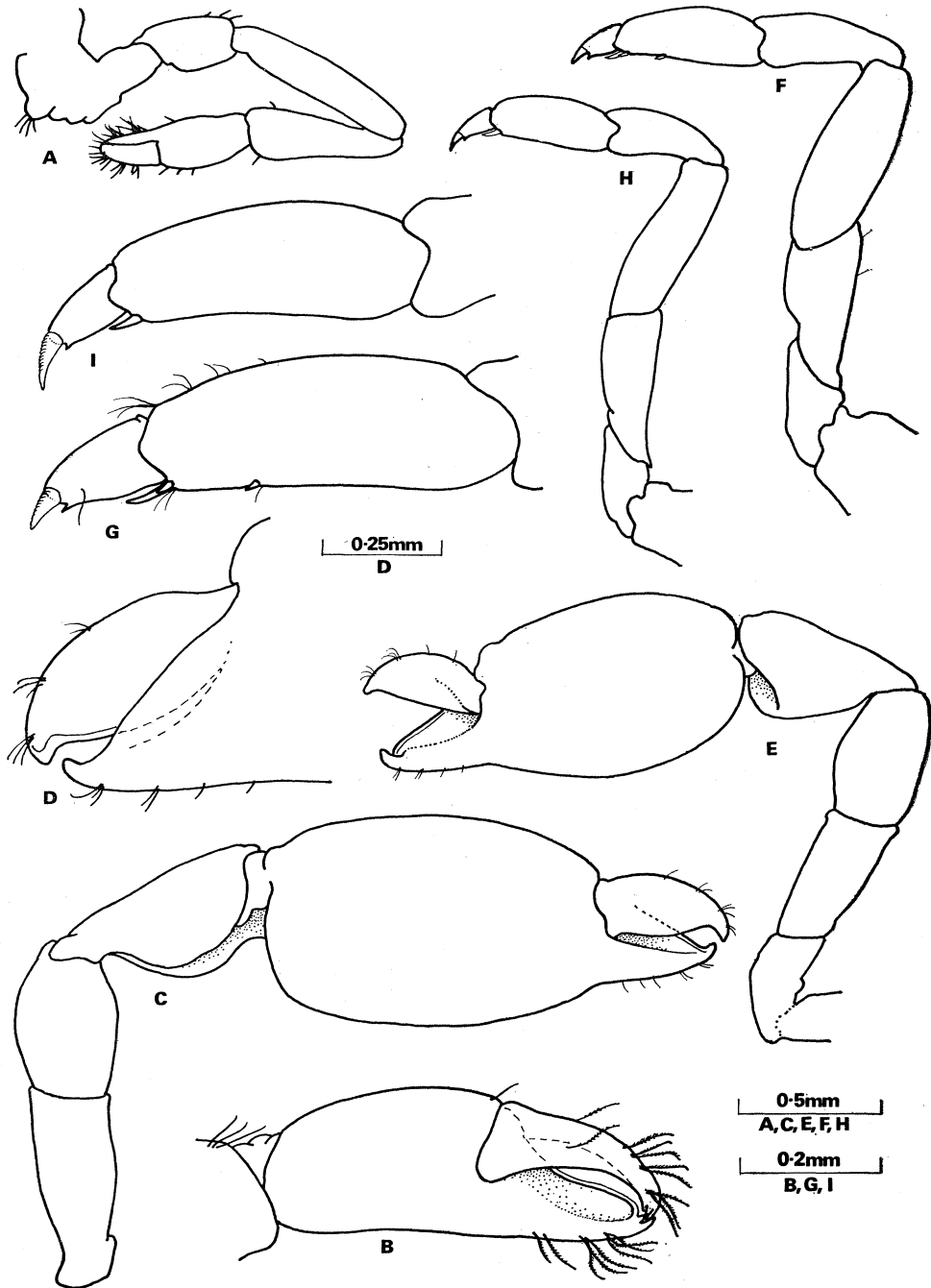


Figure 4. *Typton australis* sp. nov. Female, holotype. A, first pereiopod. B, chela of first pereiopod. C, major second pereiopod. D, fingers of major second pereiopod, lateral aspect. E, minor second pereiopod. F, third pereiopod. G, propod and dactyl of first pereiopod. H, fourth pereiopod. I, propod and dactyl of fourth pereiopod

The telson is broad, 1.5 times longer than wide, and tapering posteriorly. Anteriorly the lateral margins are convex and posteriorly almost straight. The posterior margin is about 0.4 times the anterior width, and is feebly rounded. Two pairs of subequal marginal dorsal spines are present, equal to about 0.1 of the telson length and situated at 0.56 and 0.85 of the telson length. Three pairs of terminal telson spines are present. The lateral spines are short and stout, equal to about half of the length of the dorsal spines. The intermediate telson spines are twice the length of the dorsal spines, slender, tapering and not swollen. The submedian spines are similar to the intermediate spines but slightly more slender. The posterior telson spines are separated by small intervals from which a few simple setae arise.

The eyes are well developed and extend far beyond the rostrum, reaching to the level of the anterior margin of the basal segment of the antennular peduncle. The eyestalk is stout, about 1.4 times longer than wide, and is subcylindrical, although strongly flattened medially and tapering distally. The cornea is hemispherical, markedly oblique and has a distinct accessory pigment spot dorsally.

The antennae are strongly reduced. The antennular peduncle exceeds the eye by the two distal segments. The basal segment is narrow, three times longer than wide, with subparallel sides. The stylocerite is short and feebly developed, not exceeding the proximal third of the length of the basal segment, with a short acute tip. The medial border is without a ventral spine and the disto-lateral angle is not produced and bears a small blunt process only. The statocyst is well developed but appears to lack any statolith. The intermediate segment is short, stout, subcylindrical, and equal to a little less than a quarter of the length of the intermediate segment and is also distinctly narrower. The lower antennular flagellum is very short and consists of only three stout subcylindrical segments. The upper flagellum is also markedly reduced. The two rami are fused proximally as one segment. The shorter free ramus consists of a single stout segment only and the longer free ramus is composed of three tapering subcylindrical segments only. Four groups of well developed aesthetascs are present.

The antenna is also strongly reduced. The basicerite is stout and unarmed. The carpocerite reaches to the middle of the intermediate segment of the antennular peduncle, and is strongly flattened, about 5.0 times longer than wide. The merocerite is stout and subcylindrical, equal to one third of the length of the carpocerite. The antennal flagellum is short, only slightly longer than the carpocerite and consists of nine segments. The scaphocerite is also reduced, reaching only to the middle of the carpocerite. The lamina is narrow, four times longer than wide, broadest centrally, and with a rounded tip. There is no disto-lateral spine and the anterior and medial margins bear a few short simple setae only.

The mouthparts present few special features. The epistome is normal and unarmed. The mandible has a short stout body, continuous with a robust molar process. The distal end of the molar process bears a slender blunt posterior tooth and a broad acute anterior tooth, with small squames on its inner aspect, and with some short simple setae between the two. The incisor process is well developed but slender and not robust, bearing four small acute teeth distally, of which the lateral tooth is distinctly larger than the other. The mandibular palp is absent.

The maxillula bears a short stout feebly bilobed palp, with a small seta distally on the inner lobe. The upper lacinia is narrow, obliquely truncated distally, with seven short stout spines along the distal border. A few sparsely plumose setae are also present along the medial border. The lower lacinia is short and stout, but not expanded, with ten slender, setulose setae distally.

The maxilla has a short stout palp which lacks any terminal or subterminal setae but bears two small plumose setae on its lateral border. The basal endite is well developed, simple, robust and broad distally. The distal margin is simple and bears thirteen slender, feebly setulose setae. There is no trace of a coxal endite. The scaphognathite is well developed and slender, about 3.2 times longer than broad.

The first maxilliped bears an elongated, non-setose palp. The coxal and basal endites are fused with no indication of any separation. The fused endite is broad generally but subacute disto-medially. The lateral border is emarginated near the middle of its length and the medial border is distinctly concave over the distal four fifths of its length, the proximal portion being slightly produced medially. The medial border bears numerous long slender simple setae in marginal and submarginal rows. A small group of four setae is also present on the proximal medial projection. The exopod is well developed, broad and flattened, with four long terminal and two short subterminal plumose setae. The caridean lobe is well developed and elongated and narrow. A feebly bilobed epipod is also present.

The second maxilliped is of normal form. The terminal segment is broadened distally and bears a row of stout strongly spinose spines along the medial border, with a submarginal row of slender setose setae. The penultimate segment is expanded proximally and bears seven slender spines on its antero-medial angle. The carpal segment has the proximal medial angle feebly produced. The ischium and basis are completely fused. The coxa bears a small triangular median process. The exopod is robustly developed, broad and flattened, with six well developed plumose distal setae. A small suboval epipod, without a podobranch, is also present.

The third maxilliped shows no special features. The basis is completely fused with the ischiomerus. The antepenultimate segment is slender, slightly tapering distally, about 3.4 times longer than broad. The medial border is sparsely provided with slender setulose setae. The penultimate segment is 2.25 times longer than broad and about half the length of the antepenultimate segment. The medial border is armed with more robust and densely setulose setae. The terminal segment is twice as long as broad and 0.3 times the length of the antepenultimate segment. The distal and medial borders are provided with numerous finely denticulate setae. The exopod is robustly developed, broad, and flattened, and exceeding the distal margin of the penultimate segment of the endopod. It bears eight well developed plumose setae distally. A rounded epipod is present but there is no arthrobranch.

The first pereopod is moderately robust. The palm of the chela is subcylindrical, slightly compressed, 1.5 times longer than deep. The dactylus is about 0.8 times the length of the palm. The fingers are subspatulate, with laterally situated, entire, cutting edges. Distally each finger bears a larger medial and smaller lateral acute tooth. Numerous groups of finely serrated setae are present on the fingers. The carpus is about 1.1 times the length of the chela, three times longer than broad, and narrowed proximally. The merus is 1.2 times the length of the carpus and of uniform width. The ischium is slightly less than half the length of the merus. The basis is subequal to the ischium and the coxa bears a small rounded setose medial process. There is no median sternal spine on the fourth thoracic sternite.

The second pereopods are small, similar, and slightly unequal. The palm of the larger second pereopod is subcylindrical, swollen, slightly compressed, about 1.6 times longer than deep, and smooth. The fingers are short and compressed and the cutting edges oppose with a scissor-like action. The dactylus is about one third of the length of the palm. The dorsal border is convex and a strong subacute tooth is present distally. The cutting edge is convex, entire, and without any teeth. The fixed finger is triangular with a strong hooked distal tooth. The cutting edge is

almost straight and entire throughout its length. The fingers bear a few groups of short setae. The carpus is stout, a little more than twice as long as broad, expanded and slightly excavated distally with unarmed distal margins. The merus is also stout and unarmed, about 1.5 times longer than broad, and 0.6 times longer than wide, and narrowed proximally. The smaller second pereiopod is generally similar to the larger except that the cutting edge of the dactylus is almost straight. The carpus is slightly shorter and less stout than in the major second pereiopod, as are also the merus and ischium. The coxa is without any median process.

The ambulatory pereiopods are robust. The third pereiopod extends anteriorly to exceed the carapocerite by the propod and dactylus. The dactylus is stout, about 2.2 times longer than its basal width. The unguis is distinct and acute, equal to about one third of the total length, and with small transverse furrows across the dorsal surface. The body of the dactylus is feebly compressed and bears a small acute accessory spine distally. The ventral border is otherwise entire. The propod is short and stout, about 2.5 times longer than the dactylus, and 2.9 times longer than broad, tapering slightly distally. The ventral border bears a long and a short distal spine, with another single short spine at about two thirds of its length. The carpus is subequal in length to the propodus, slightly tapered proximally, and unarmed. The merus is stout, 2.8 times longer than broad, and 1.25 times the length of the propod. The ventral margin is unarmed and devoid of spines. The ischium is broad and compressed, narrowed proximally and equal to 0.8 times the length of the merus. The basis is about 0.6 times the length of the merus and the coxa lacks any median process. The fourth pereiopod is generally similar to the third but is distinctly more slender and slightly shorter. The dactylus is similar but more slender, with a more acute unguis and a smaller accessory spine. The propod is more slender and bears only a single distal ventral spine. The fifth pereiopods are missing.

The pleopods are normal, with elongated peduncles and small narrow rami.

The uropods are normal. The basipodite is stout and unarmed. The exopod is broad, about 1.7 times longer than broad. The lateral border is strongly convex, entire, with a few marginal setae, and terminating in a small acute tooth with a large mobile spine medially. The exopod is also broad, and slightly narrower than the endopod, which it slightly exceeds.

The ova are large and few in number, about ten being still present.

Type. The single ovigerous female specimen available is designated as the holotype and is deposited in the collections of the Australian Museum, Sydney, Catalogue number AM P 17936.

Colour. No information is available. No persistent trace of colour pattern remains.

Measurements. Post orbital carapace length, 1.75 mm; total body length (approx.), 6.5 mm; length of chela of major second pereiopod, 1.6 mm; length of chela of minor second pereiopod, 1.3 mm; greater diameter of ovum, 0.63 mm.

Host. Unidentified.

Systematic position. The new species, *Typton australis*, appears to be most closely related to the tropical American species *T. tortugae* (McClendon) which is known from the Bermudas, Florida, and the Gulf of California (Holthuis, 1951a), rather than to the two known Indo-West-Pacific species.

In *T. tortugae* the orbit is feebly developed and lacks the large para-orbital spines found in most species of *Typton*. The eyes, antennae, mouthparts and pereopods are all generally similar to those of *T. australis*. Points of difference between the two species are enumerated below:

| <i>T. australis</i> | <i>T. tortugae</i> |
|--|---|
| 1. Inferior orbital angle completely absent. | Inferior orbital angle (?) slightly produced. |
| 2. Antennular flagella greatly reduced, fused portion of rami unisegmented. | Antennular flagella less reduced, fused portion of rami of 5-6 segments. |
| 3. Scaphocerite reduced but reaching to middle of carpocerite. | Scaphocerite greatly reduced, not reaching to proximal end of carpocerite. |
| 4. Maxillula with upper lacinia slender. | Maxillula with upper lacinia broad. |
| 5. Maxilla with basal endite simple. | Maxilla with basal endite deeply bifid. |
| 6. Second pereopod with dactylus not semicircular, elongated; both fingers without teeth; merus without ventral spinulation. | Second pereopods with dactylus semicircular; fingers with small teeth proximally on cutting edges; merus ventrally spinulate. |
| 7. Telson with small marginal dorsal spines on posterior half. | Telson with large submarginal dorsal spines on anterior half. |

Points of particular taxonomic importance which are found in both *T. australis* and *T. tortugae* are listed below:

1. Rostrum short, compressed, toothless.
2. Large acute "para-orbital" spines absent.
3. Incisor process of mandible well developed.
4. Exopods of maxilliped well developed.
5. Chela of second pereopods similar and only slightly unequal.
6. Dactyls of ambulatory pereopods slender with feeble accessory spines.
7. Exopod of uropod with entire lateral border.

Typton australis may be easily separated from the two Indo-West-Pacific species. It may be easily distinguished from *T. dentatus* Fujino and Miyake (1969), by the absence of a dorsally dentate rostrum and antennal spines, and from the new species of *Typton* (Bruce, in press, b) from the Indian Ocean by the absence of an inferior orbital angle, the presence of a large acute tooth on the fixed fingers of the second pereopod, the slender propods, and the absence of spinulation along the ventral borders of the dactyls of the ambulatory pereopods. From these species *T. australis* differs noticeably in the relative size of the scaphocerite, which is reduced to a very small rudiment in both, considerably smaller in size than is found in *T. australis*.

DISCUSSION

The genus *Typton*, was established by Costa (1884) for the Mediterranean species *T. spongicola*, which has been subsequently found along the eastern Atlantic coasts of Europe and Africa (Holthuis, 1951a). More recently a further seven species from central American waters have now been placed in the same genus (Holthuis, 1951b). Prior to 1969 the genus appeared to be absent from the Indo-West Pacific region, of which the shallow water pontoniinid fauna appeared to be relatively well known, and included numerous sponge associated species with which *Typton* might have been expected to occur. The first species to be discovered in the Indo-West

Pacific region was *T. dentatus* reported from the Ryukyu Islands by Fujino and Miyake (1969) and subsequently a new species has been found in the western Indian Ocean (Bruce, in press, b). It is unfortunate that both these species are incompletely known, as the second pereopods were partly or completely lacking from the few specimens known.

In the reports upon *T. dentatus* and the new Indian Ocean species, it was found necessary to modify the description of the genus given by Holthuis (1951a) and the discovery of *T. australis* appears to render further modification necessary. The latter species presents some characteristics showing an affinity to the genus *Onycocaris* Nobili, also found in association with sponges. Three features are particularly important in this context.

1. *The scaphocerite.* In *T. australis* this appendage is much less reduced than in any other species of *Typton*. This reduction of the scaphocerite is the main diagnostic character (Holthuis, 1952), used to separate *Typton* from all other pontoniinid genera, other than the unrelated genus *Paratypton* Balss (Bruce, 1969). In most genera, the scaphocerite far out-reaches the carapocerite. In the genus, *Onycocaris*, several species show reduction of the scaphocerite so that the lamina is distinctly exceeded by the carapocerite, for example *O. spinosa* and *O. quadratophthalma*, (Fujino and Miyake, 1969). In *T. australis* the lamina of the scaphocerite reaches a little beyond the middle of the carapocerite and is therefore intermediate between the two genera.

2. *The chelae of the second pereopods.* In his definition of the genus *Typton*, Holthuis (1951a) states that the second legs are very heavy and unequal. This is certainly true of most species but, as noted above, the characteristic is not particularly well marked in *T. tortugae*. The condition in the two Indo-West Pacific species *T. dentatus* and *T. bawii* is uncertain in as much as the chelae are completely unknown in the former and only one, probably the smaller, is known in the latter. It cannot be said therefore that the chelae are very heavy and unequal in the Indo-West Pacific species. In *T. australis*, where both second pereopods have fortunately been preserved, the chelae are small, similar and only slightly unequal. In addition, the palm of the chela, although swollen, is noted to be slightly compressed. In most species of *Onycocaris* the chelae of the pereopods are similar and of subequal size. In most species the palm is distinctly compressed, for example, in *O. quadratophthalma* Balss, but in some, such as *O. stenolepis* Holthuis and *O. monodoa* Fujino and Miyake, this is not particularly marked. In this respect also, *Typton australis* appears as an intermediate stage between *Typton* and *Onycocaris*.

3. *Carapace spines.* In most species of the genus *Typton* a large "paraorbital" spine is present forming the lateral limit of the orbit. These spines do not appear to be homologous with the inferior orbital angle or the antennal spines found in other pontoniinid shrimps (Holthuis, 1951a; Bruce, in press, b). In *Onycocaris* the inferior orbital angle may be acutely produced, as in *O. monodoa* or broadly rounded and blunt as in *O. spinosa*. *Typton australis* shows considerable similarity to the latter species in the form of the anterior margin of the carapace in which the inferior orbital angle is obsolescent and the antennal spine absent. In all three Indo-West Pacific species, the conspicuous "paraorbital" spines found in the other members of the genus (with the exception of *T. tortugae*), are absent. In *T. dentatus* the antennal spine is stated to be distinct. It is small and situated at the inferior orbital angle and is slender and acute. It shows considerable resemblance to the antennal spine of *O. monodoa* and is probably more correctly considered to be the inferior orbital angle. In the new Indian Ocean species, the inferior orbital angle is produced and broadly angular. In this respect again, *T. australis* represents a link between the genera *Typton* and *Onycocaris*.

Most of the morphological features that have been noted as characteristic of *T. australis* are of a negative nature. The scaphocerite is not so reduced as in other *Typton* species, there are no "paraorbital" spines, the chelae of the second pereopods are not large and unequal as in *Typton* or subequal and compressed as in *Onycocaris*. In other words, *T. australis* lacks many of the specializations that have been developed in the other species of *Typton* and *Onycocaris*. In this sense it is primitive and may be closely related to the ancestral stock of both genera.

If the present specimen is correctly referred to the genus *Typton*, we must modify further the redefinition of the genus that was recently given (Bruce, in press, b). This course appears preferable to the erection of a poorly defined monospecific genus, intermediate between *Typton* and *Onycocaris*. Further information on important features of the two other Indo-West Pacific species, such as the morphology of the chelae of the second pereopods, may indicate that the three species do form a natural unit, distinct from those from other regions. Until such further information becomes available, this specimen is placed in a definition of the genus *Typton* modified to include species with or without "paraorbital" spines, with the inferior orbital angle produced or obsolescent, with second pereopods large, unequal and dissimilar or small, similar and subequal.

The ova in *T. australis* are unusually large and few in number. In general the longer axes of the ova of pontoniinid shrimps are about 0.5 mm, although some small species have much smaller ova. The ova of *T. australis* are unusually large for the size of the shrimp. Their size (0.63 mm) however, is comparable to that of *T. spongicola* Costa which is given by Lebour (1925) as 0.5–0.8 mm, and is well below the size found in *Pontonia minuta* Baker (1.3–1.5 mm), in which abbreviation of the series of larval stages occurs (Bruce, in press).

Although the host was not identified, it is most probable that *T. australis*, like other species of the genus *Typton*, lives in association with sponges.

ACKNOWLEDGMENT

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